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THE SAMPLES DISCUSSED IN THIS REPORT WERE COLLECTED BY E&E/FIT FROM FEBRUARY 27 THROUGH MARCH 12, 1986. THE SAMPLING RESULTS WERE GENERATED FROM TWENTY EIGHT SOIL SAMPLES, FOUR SURFACE WATER SAMPLES, FIVE OILY SAMPLES, TWENTY SEVEN SOIL VAPOR SAMPLES, ONE FIELD BLANK AND ONE SUBSURFACE SOIL SAMPLES.

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ANALYTICAL RESULTS REPORT
FOR NINE SITES
IN SOUTH ADAMS COUNTY, COLORADO

TDD R8-8604-10
CASE #5644/2149H

94-35041

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DATE SUBMITTED: JULY 22, 1994

7

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ANALYTICAL RESULTS REPORT
FOR NINE SITES
IN SOUTH ADAMS COUNTY, COLORADO
TDD R8-8604-10

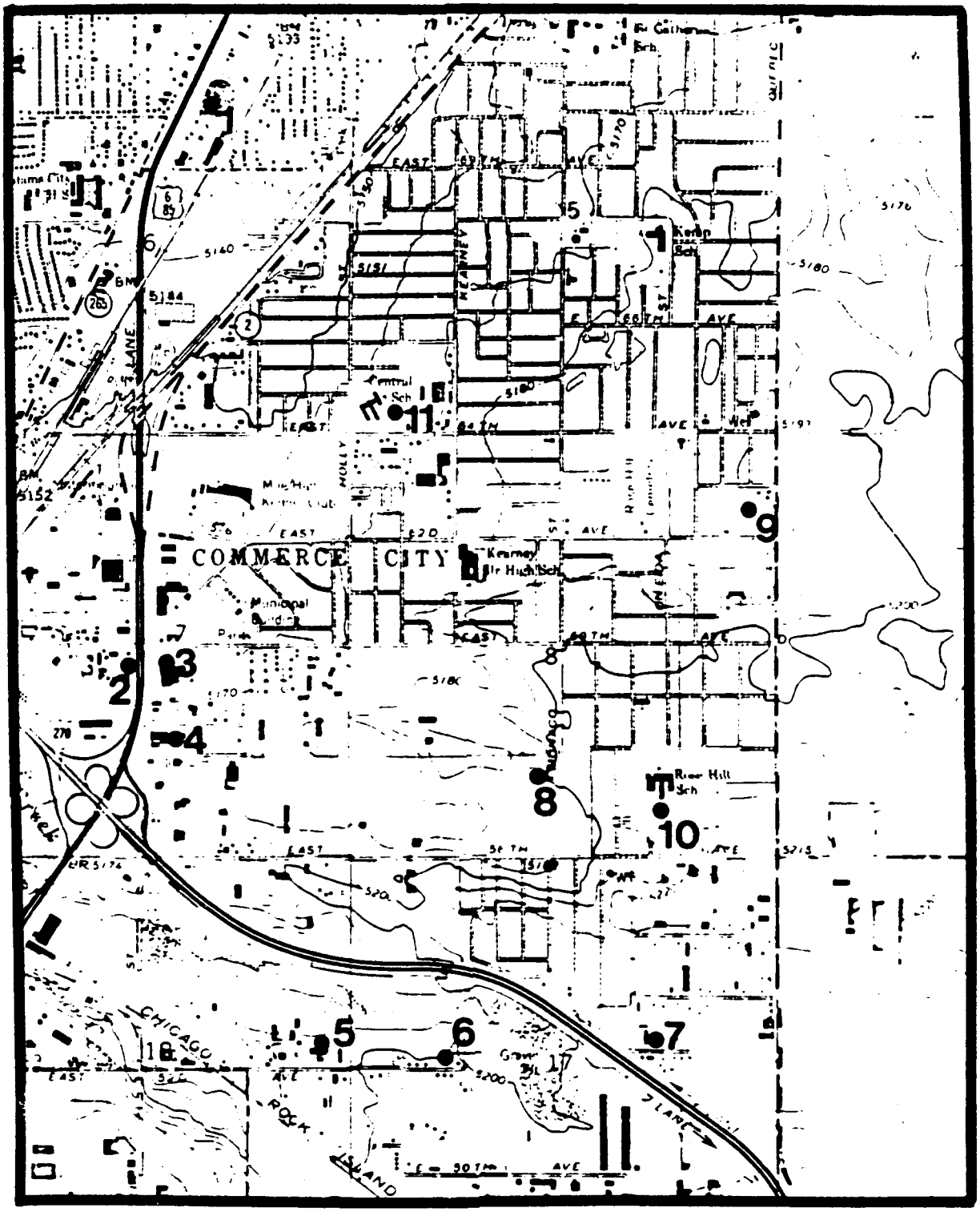
I. INTRODUCTION

This report has been prepared to satisfy the requirements of Technical Directive Document (TDD) R8-8604-10, issued to the Ecology and Environment, Inc., Field Investigation Team (E&E/FIT) by the Region VIII office of the U.S. Environmental Protection Agency (EPA).

The samples discussed within this report were collected by E&E/FIT from February 27 through March 12, 1986. Two previous reports present discussions regarding project objectives, site description, sampling procedures, quality control, sample documentation and field observations. These reports include the Sample Plan (TDD R8-8601-05) and the Sample Activities Report (TDD R8-8601-05).

The sampling results discussed in this report were generated from twenty eight soil samples, four surface water samples, five oily samples, twenty seven soil vapor samples, one field blank and one duplicate sample. The soil samples are broken down into surface and subsurface soil samples. The oily samples are also further broken down into oily soil samples and oily water samples.

On November 15, 1985, under TDD # R8-8509-03, a Contaminant Source Identification Workplan - South Adams County, Colorado was submitted to the EPA. This Workplan addressed the ground water contamintation problem in SAC and targeted areas and industrial sites for further site investigation. FIT completed Preliminary Assessments (PA) on 29 of these targeted sites between 11/12/85 and 12/17/85 under TDD # R8-8511-12. Of these 29 sites, 26 are non-RCRA and 3 are RCRA sites. The information collected during site visits and interviews was used to determine which sites needed further investigation. FIT recommended that nine of these sites undergo field sampling.



LEGEND:

1. Colorado Truck Parts
2. Ward Transport
3. H.W. Moore Equipment Co.
4. Stewart & Stevenson Power
5. Thermo King Denver
6. Onnen Tank & Trailer
7. Ginco, Inc.
8. Cooper Energy Services
9. Landfill, E. 63rd & Quebec St.
10. Background Sample, Rose Hill School
11. Background Sample, Central School

FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES TASK REPORT TO THE E.P.A.	
TITLE: Locations of nine sites in south Adams County, CO. T.D.D. R8-8604-10	
ecology and environment, inc.	Fig. 1
Date 3/86 Source USGS Scale 1:24000	

TABLE 1

LOCATIONS OF NINE SITES SAMPLED IN COMMERCE CITY,
SOUTH ADAMS COUNTY, COLORADO

	SITE NAME	LOCATION
1.	Colorado Truck Parts	7000 Eudora Street
2.	Ward Transport	5901 Dexter Street
3.	H.W. Moore Equipment Co.	5990 Dahlia Street
4.	Stewart & Stevenson Power, Inc.	5840 Dahlia Street
5.	Thermo King Denver	5455 E. 52nd Avenue
6.	Onnen Tank & Trailer	6087 E. 52nd Avenue
7.	Ginco, Inc.	5280 Newport Street
8.	Cooper Energy Services	5675 Monaco Street
9.	Landfill	E. 63rd Avenue & Quebec Street

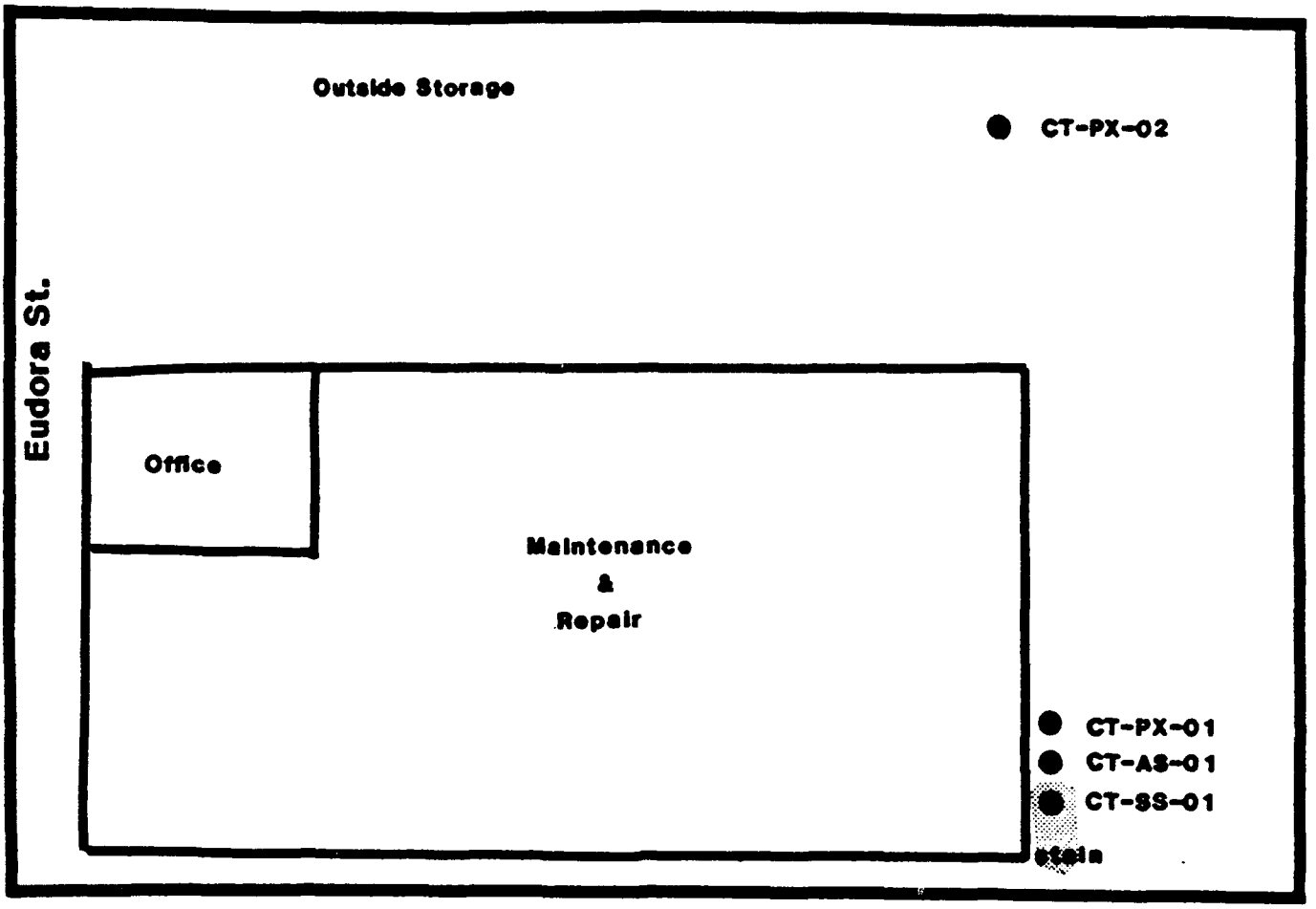
The purpose of this sampling investigation was to screen nine sites for potential soil and groundwater contamination. All nine of these sites are located in Commerce City, Colorado, which is in South Adams County, directly northeast of the city of Denver (Figure 1).

The nine sites under investigation are located in an area roughly bounded by East 72nd Avenue to the north, East 52nd Avenue to the south, Quebec Street to the east and Colorado Boulevard to the west. Figure 1 illustrates the locations of these sites and Table 1 lists the name and street location of each site. The nine sites were selected for preliminary sampling on the basis of the quantity of solvent on site, waste disposal and storage practices for solvents, general housekeeping and previous history of the site. Although most of these establishments are currently using unchlorinated solvents, it is possible that chlorinated solvents were used in the past. The Preliminary Assessment forms (PA) and accompanying cover letter for each of these sites detail the wastes generated at each site, disposal practices and other detailed information on why the site was selected for a screening sampling (TDD R8-8511-12). Individual site descriptions are included below.

A. COLORADO TRUCK PARTS

Colorado Truck Parts is located at 7000 Eldora Street and has been operating at this site for 12 years. This establishment is involved in salvaging parts from trucks and minor truck repairs. The site consists of an office, shop/garage area and a fenced-in, unpaved lot around the building (Figure 2). This lot is almost completely filled with salvaged truck parts arranged in a semi-orderly fashion.

Materials stored on-site include waste oil and Dyna-sol, an unchlorinated petroleum distillate. The waste oil is removed by Western Waste and the solvent is serviced by the supplier. FIT observed a 5' X 15' area of ground at the southeast corner of the building which was stained, apparently with motor oil. There were three empty unlabelled 55 gallon drums in this area in addition to a waste oil barrel. Organic vapor readings were at background levels in this area.



FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES
TASK REPORT TO THE E.P.A.

TITLE:

Sampling Locations at Coloredo Truck Parts

T.D.D. R8-8604-10

ecology and environment, inc. | Fig. 2

3/86 Drawn by E&E Not to Scale

B. WARD TRANSPORT

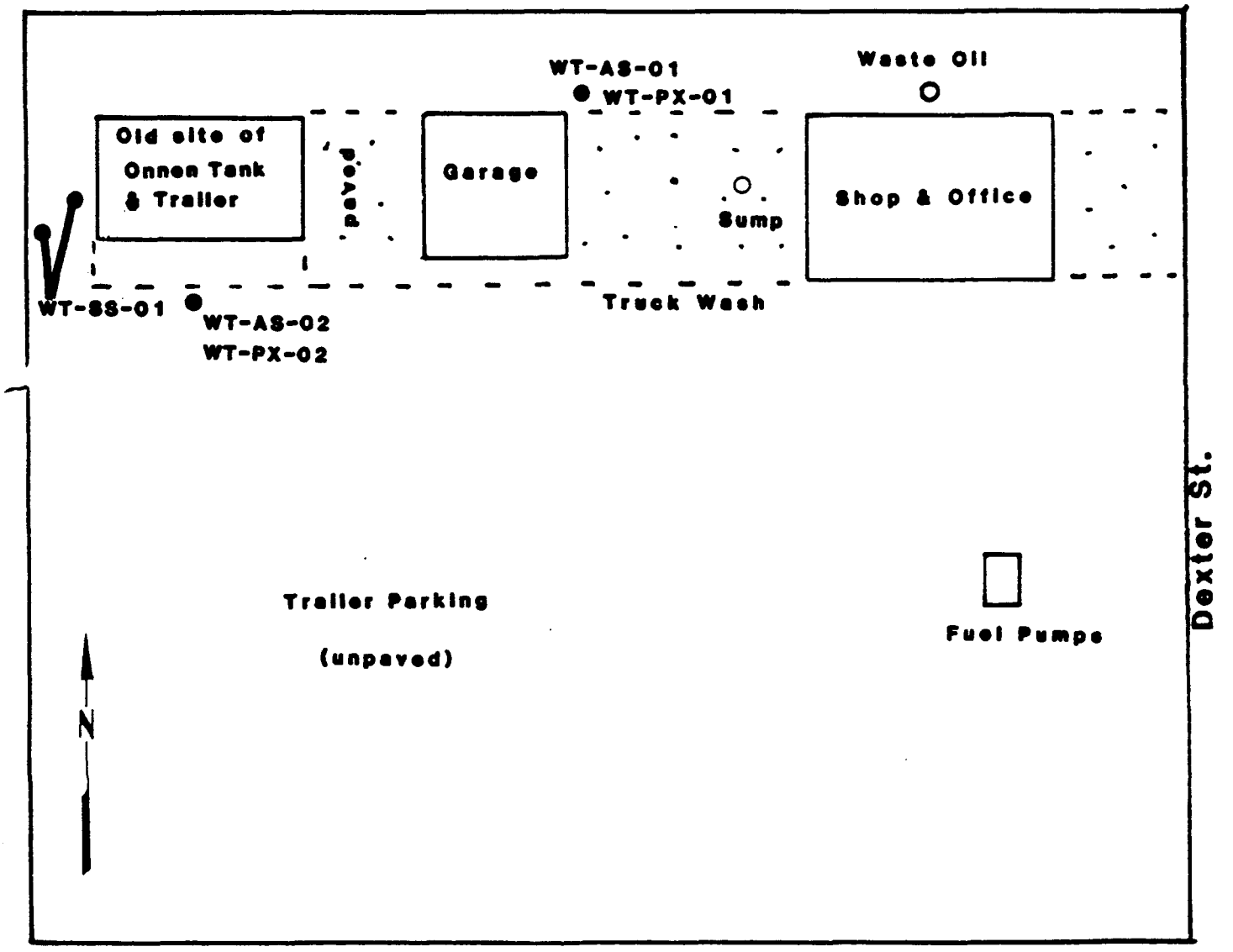
Ward Transport is located at 5901 Dexter Street and has been operating at this location for approximately 30 years. Primary activities at Ward are truck repair, maintenance, and dispatching.

Materials presently stored at Ward include diesel fuel, motor oil, waste oil, methanol and mineral spirits. All materials except diesel fuel and waste oil are stored inside. Diesel fuel is stored in underground tanks and waste oil is stored in an above ground 500 gallon tank on the north side of the office and garage (TDD R8-8511-12). Directly west of the dispatching building and garages is a truck wash area and an underground collection sump. (Figure 3)

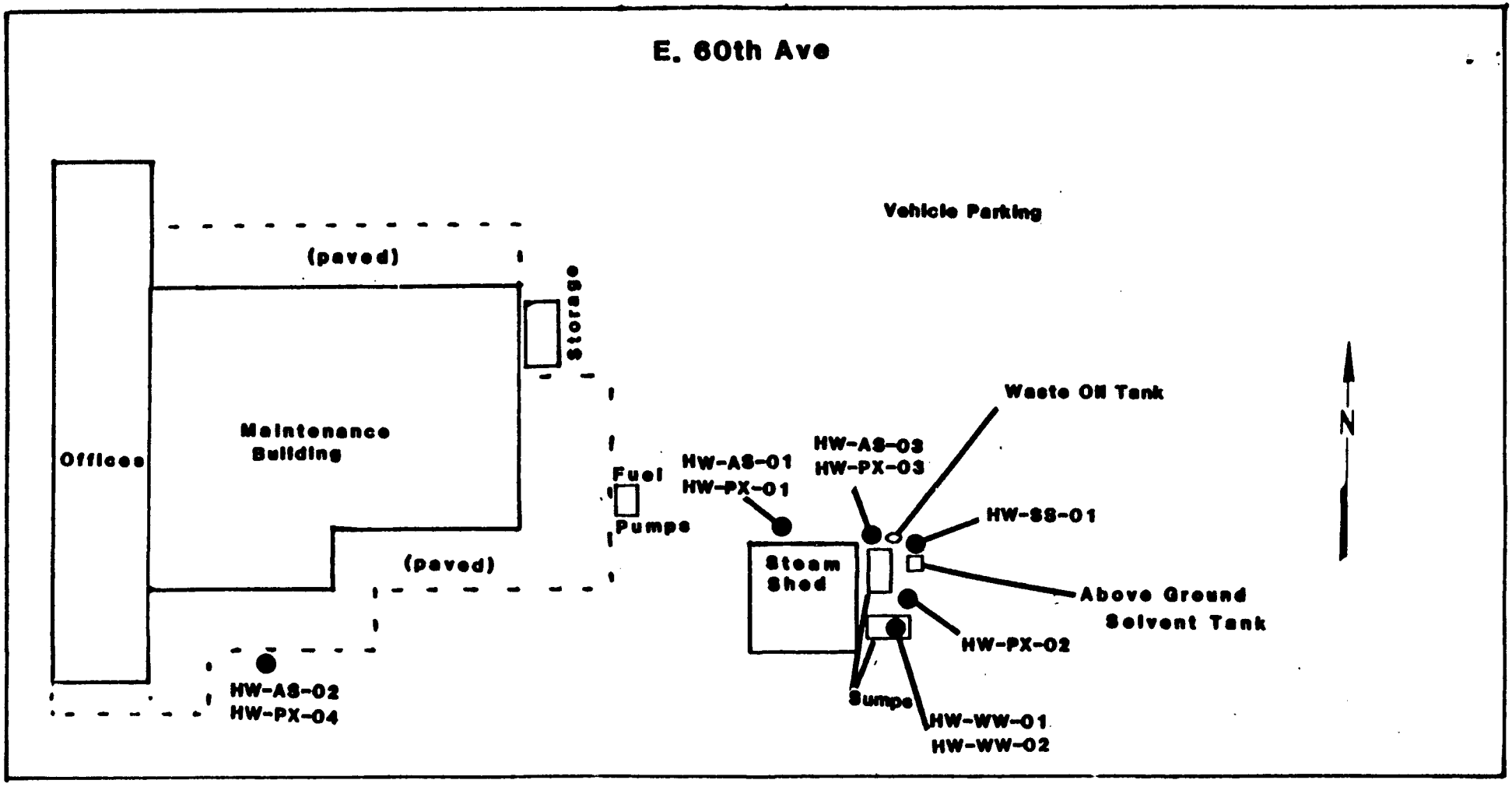
C. H.W. MOORE EQUIPMENT CO.

H.W. Moore Equipment Co. is located at 3990 Dahlia Street and has been operating at this location for approximately 30 years. Activities at the facility include the sale and service of heavy construction equipment. Materials presently stored at the site include diesel fuel, gasoline, stoddard solvent (unchlorinated), petroleum distillate, motor oil and waste oil (TDD R8-8511-12). The waste oil, gasoline and diesel fuel are stored in underground tanks. The petroleum distillate is stored inside the shop areas in enclosed cleaning stations. The stoddard solvent is stored in a 500 gallon above ground storage tank next to the underground waste oil tank. FIT observed that the ground surface in this area was heavily stained, apparently with oil and possible solvents.

Also on-site are two large concrete sumps which receive water from the steam shed where equipment is washed before painting. (Figure 4) The sumps are approximately 20' x 50'. Water flows from the steam shed into the northern most sump which is a sand trap that filters oil from the water. The water then flows into the southern sump and finally into the South Adams County Water and Sanitation District (SACWSD). The depth of the sump is unknown but was estimated during sample collection to be approximately 6 feet deep.



FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES TASK REPORT TO THE E.P.A.	
TITLE: Sampling Locations at Ward Transport T.D.D. R8-8604-10	
ecology and environment, inc.	Fig. 3
Date 3/86 Drawn by: E&E Scale: Not to Scale	



FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES TASK REPORT TO THE E.P.A.	
TITLE: Sampling Locations at HW Moore Equipment Co.	
T.D.D. R8-8604-10	
ecology and environment, inc.	Fig. 4
Date 3/80 Drawn by: EAE Scale: Not to Scale	

H.W. Moore was selected for screening sampling on the basis of the quantity of solvent stored outside, above ground, in an unpaved area and because of the large stained area around this tank and the waste oil tank. It is possible that chlorinated solvents were used at some time in the past 30 years of operation of this establishmnet.

D. STEWART AND STEVENSON POWER, INC.

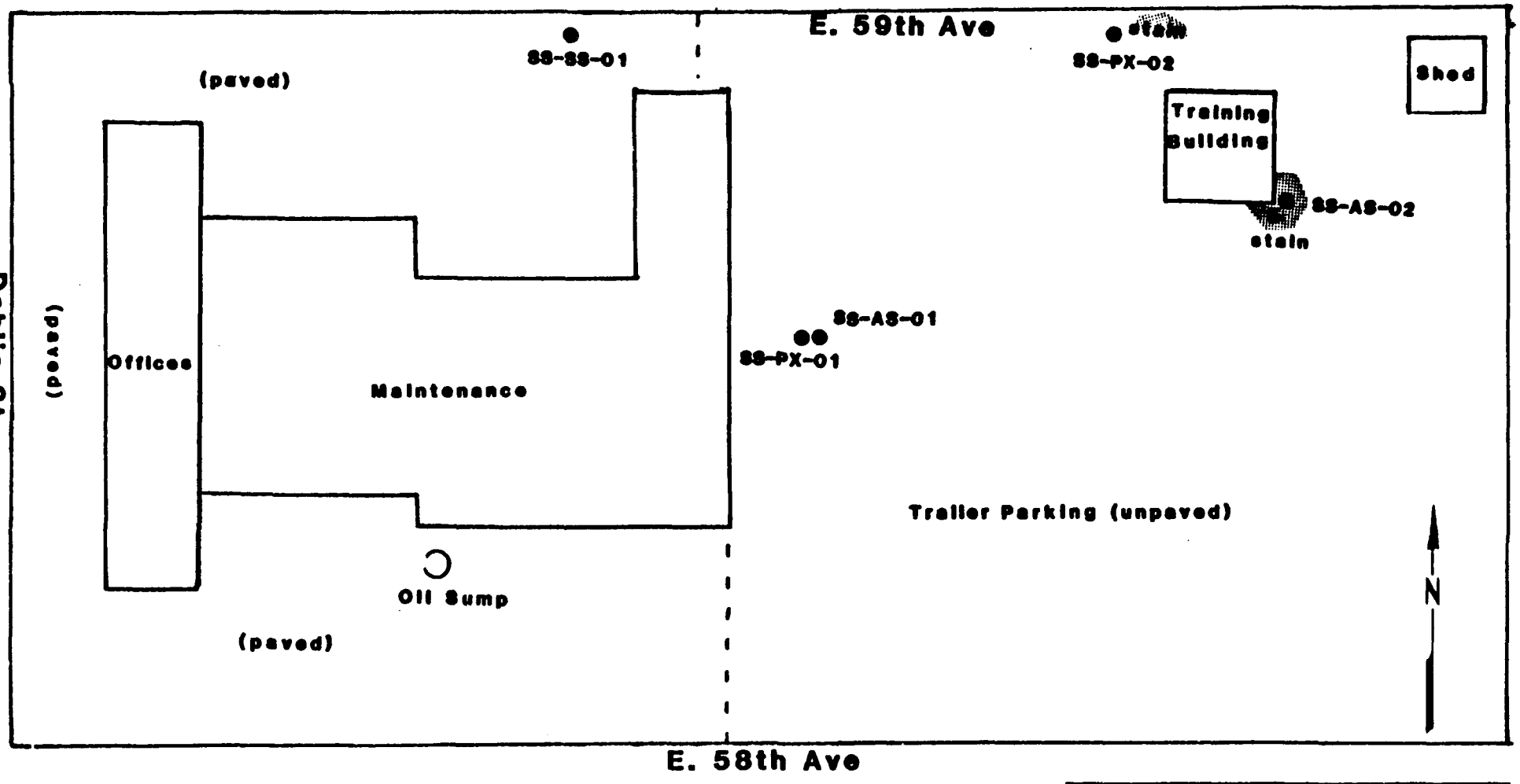
Stewart and Stevenson Power, Inc. is located at 5840 Dahlia Street and has been operating at this location since 1978. Activities at this facility include truck repair and maintenance and the sale and maintenance of engines and parts. The site consists of an office area and maintenance building. (Figure 5) There is also a small building used for training personnel at the northeast end of the property. Approximately 3/4 of the surrounding lot is paved.

Materials stored on-site include diesel fuel, stoddard solvent, oil, waste oil and various shop cleaning materials, i.e. floor cleaners. The solvent is used inside the building on a paved surface and is stored in 30 gallon steel drums. The waste oil is stored in an underground 1800 gallon steel tank which is pumped out every four months. The tank can be accessed directly from above or oil can be poured through a grate and ditch inside the building which leads to the waste oil tank. It is possible that other kinds of materials could be poured into this tank.

Stewart and Stevenson was selected for screening sampling because the large (1800 gallon) underground storage tank could contain a variety of materials which could potentially leak into the ground water. FIT also observed several stained areas on-site. In one area, water from truck washing runs across the pavement and onto the ground at the northern boundary of the property. Two more stained areas were observed near the training building.

E. THERMO KING DENVER

Thermo King Denver is located at 5455 East 52nd Avenue and has been operating at this site for 35 years. The facility consists of an



FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES TASK REPORT TO THE E.P.A.	
TITLE: Sampling Locations at Stewart & Stevenson	
T.D.D. R8-8604-10	
ecology and environment, inc.	Fig. 6
Date 2/82 Drawn by: EAE Scale Not to Scale	

office and maintenance garage. The lot in the back (north) of the facility is used as a parking area for refrigerated truck trailers. (Figure 6) Thermo King is involved in the sales and service of transport refrigerated truck bodies.

Materials stored on-site include gasoline, diesel fuel, oil, freon and two types of solvent, one chlorinated, the other unchlorinated. Waste solvent and oil are contained in a 5,000 gallon underground tank. The operator of Thermo King informed FIT that this tank was recently leak tested in February 1986 and was found to be water tight. Solvent which is in use is kept in the maintenance area in two large steel tanks, 1,000 and 600 gallons (TDD R8-8511-12).

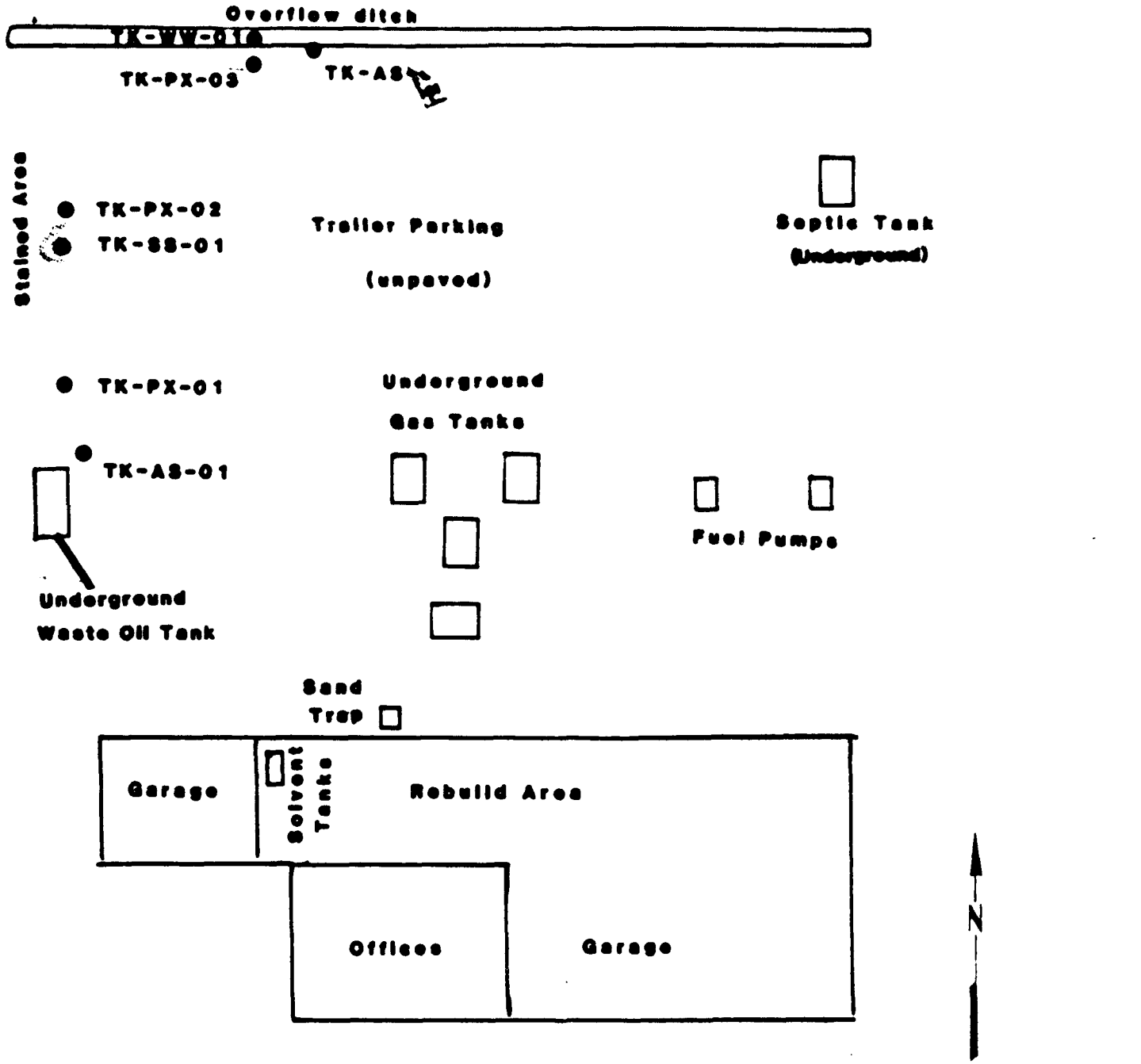
FIT observed a ditch, (approximately 1 1/2 yards x 50 yards) at the northern boundary of the property. During an interview with the site operator, FIT learned that this ditch served as an overflow basin for the drainage system in the service and maintenance building.

While on-site, FIT observed oil stains on the ground around the waste oil tank. Another stain was discovered approximately 75 feet north of the waste oil tank. The stain here was much lighter and could possibly be fuel. There were several barrels approximately 25 feet southeast of this stain, some having fluid in them. The barrels were unlabeled and one showed signs of leakage on the sides.

Thermo King was selected for screening sampling because of the large quantity of chlorinated solvents on-site, both above and below ground. There is also the possibility that a spill of solvent could occur during filling and emptying the tanks. It should also be noted that prior to Thermo King's occupation of this site, the property served as a landfill (TDD R8-8511-12).

F. ONNEN TANK AND TRAILER

Onnen Tank and Trailer is located at 6087 East 52nd Avenue and has been operating at this location since September, 1984. Onnen is



FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES TASK REPORT TO THE E.P.A.	
TITLE: Sampling Locations at Therme King	
T.D.D. R8-8604-10	
ecology and environment, inc.	Fig. 6
Date 3/86 Drawn by E&E Scale Not to Scale	

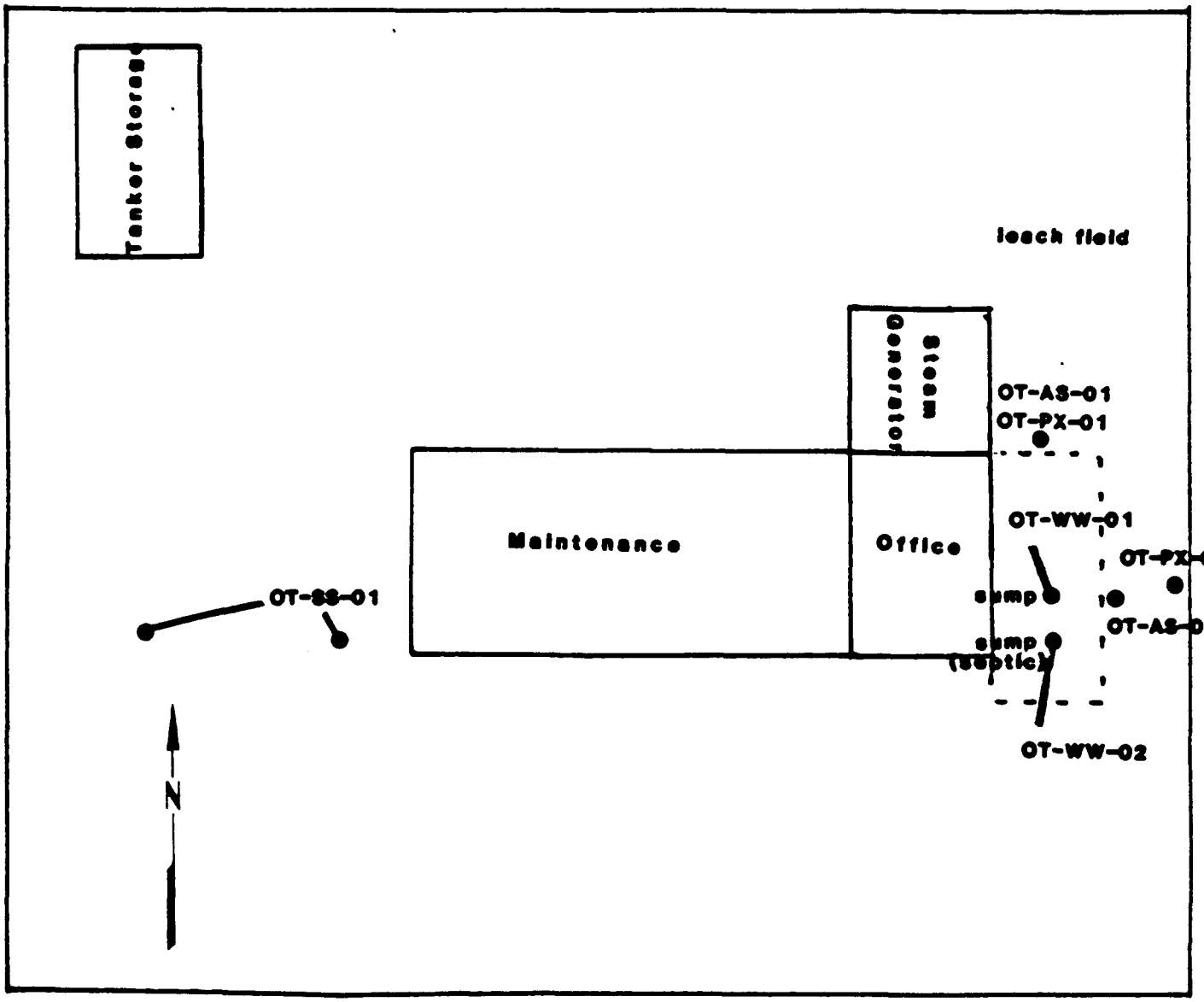
involved in tanker trailer cleaning, tank fabrication and repair. The facility consists of an office and maintenance garage, steam shed, and a wash area and sump adjacent to the east side of the building. (Figure 7)

The only material on-site is the tank bottom sludge from the collection sump and septic tank in the wash area. It was not clear whether these tanks were connected and an employee at the facility did not know for sure if they were. The water in both tanks was very oily so it seems likely that they are connected. The same employee also informed FIT that a leach field extended north from these tanks.

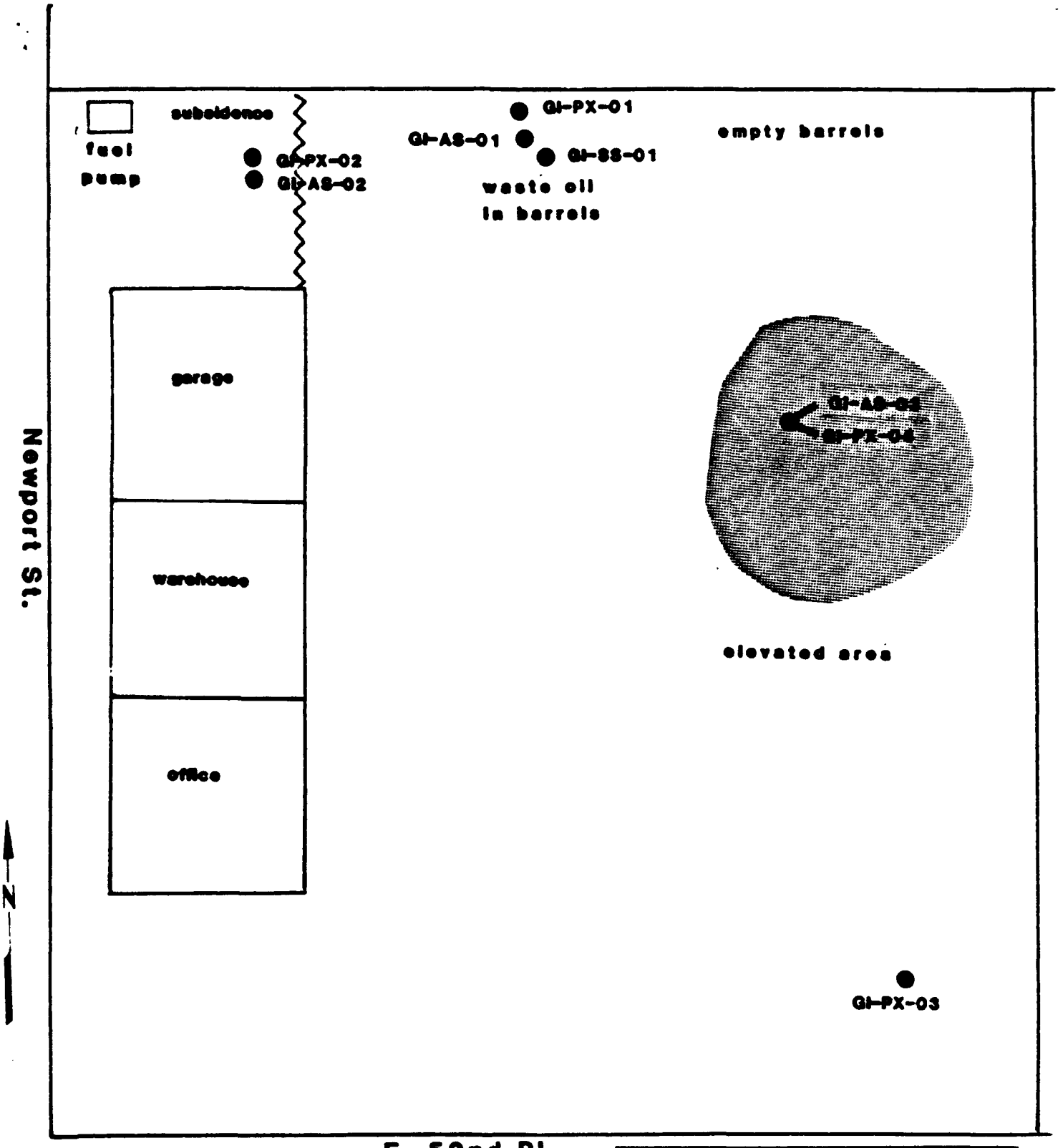
Onnen Tank and Trailer was selected for screening sampling because it is not known for sure what types of trailer tanks are cleaned out here. The owner informed FIT that only fuel tankers are cleaned out, however, FIT observed DOT placards other than flammable (such as corrosives and compressed gases) on previous drive by visits (TDD R8-8511-12). FIT also observed several stained areas on the west side of the building (possibly fuel). If hazardous chemicals are cleaned from tanker trailers at this site, it is possible that they could enter the ground water and Sand Creek which is located a few hundred feet north of this site.

G. GINCO, INC.

This site is located at the northeast corner of Newport Street and 52nd Place, and was leased by Ginco, Inc. from 1982 to late November, 1985. The facility was vacant at the time of this screening sampling. Ginco was involved in the sales of heavy equipment and parts. The facility consists of an office area, parts warehouse and service garage. (Figure 8) There is a large fenced in lot, approximately 300' x 200', to the east of these buildings. Parts of this lot are elevated and rutted and a couple pipes were sticking out of the ground. Some type of debris may have been buried in these areas. At the north end of the garage, the ground has subsided over an abandoned underground gasoline tank.



FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES TASK REPORT TO THE E.P.A.	
TITLE: Sampling Locations at Onnen Tank & Trailer	
T.D.D. R8-8604-10	
ecology and environment, inc.	Fig. 7
Date 3/86 Drawn by: E&E Scale: Not to Scale	



FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES TASK REPORT TO THE E.P.A.	
TITLE: Sampling Locations at Ginco, Inc.	
T.D.D. RS-8604-10	
ecology and environment, inc.	Fig. 8
Date 3/86 Drawn by: E&E Scale Not to Scale	

Materials stored on-site during Ginco's operation included gasoline, motor oil, waste oil and solvents. FIT obsreved approximately 6 oil stained barrels directly east of the garage. One barrel was completely open to the atmosphere and full to the top with oil. The ground was stained in this area.

This site was selected for screening sampling because it is not known whether debris was buried at this site and it is possible that the waste oil, contained in barrels and spilled on the ground, may contain other materials such as solvents.

H. COOPER ENERGY SERVICES

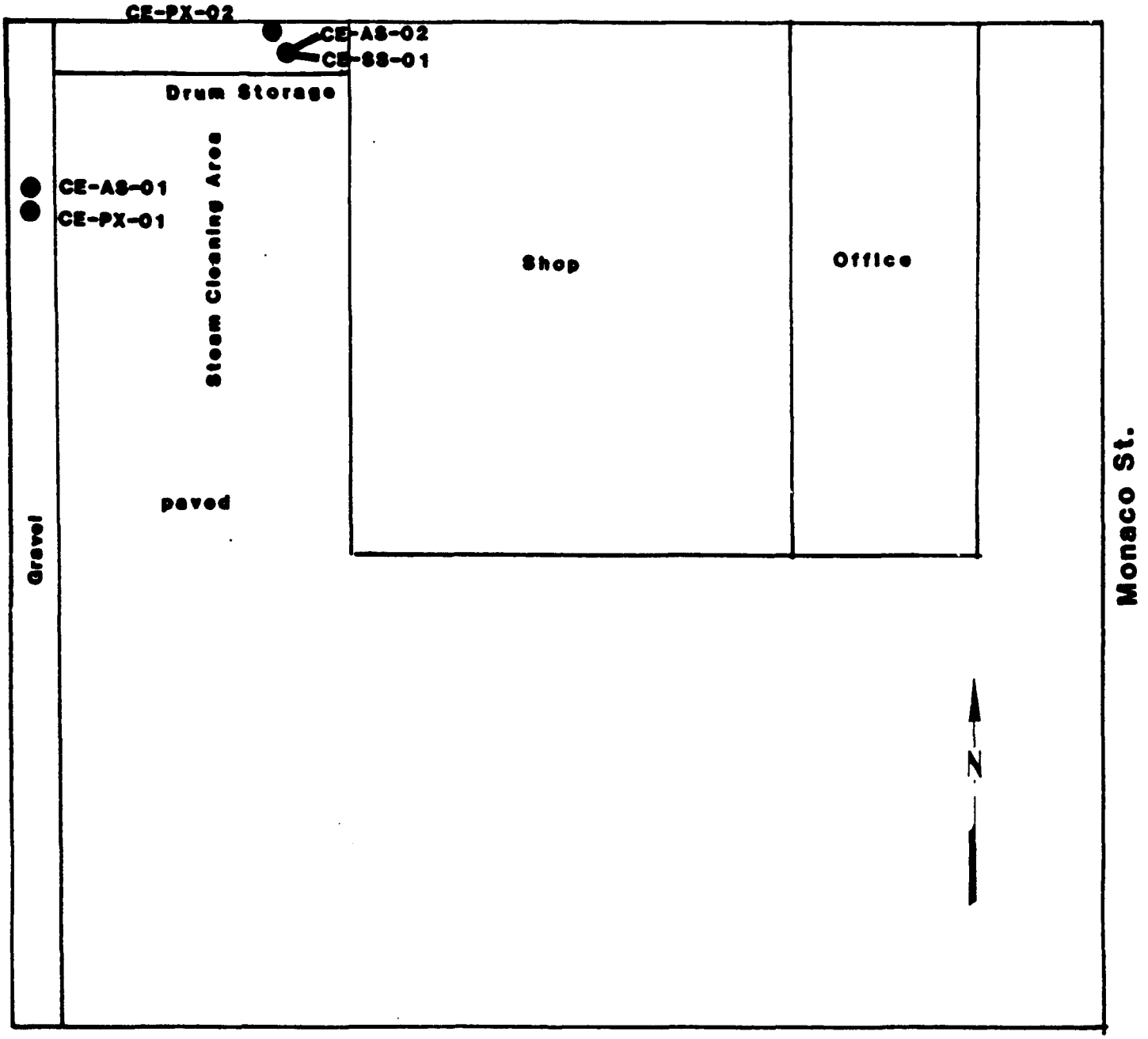
Cooper Energy Services is located at 5675 Monaco Street and is involved in the sale of parts, and repair and rebuilding of various types of engines. The facility consists of an office and maintenance garage. (Figure 9)

The solvent used on-site is Dyna-sol, an unchlorinated petroleum distillate. Large parts and machinery are washed down outside on a concrete pad west of the maintenance garage. There is no sump or other type of collection system for runoff. Solvent is stored outside in 55 gallon drums. FIT observed a large dark stain on the ground surface in this area, probably oil and solvent.

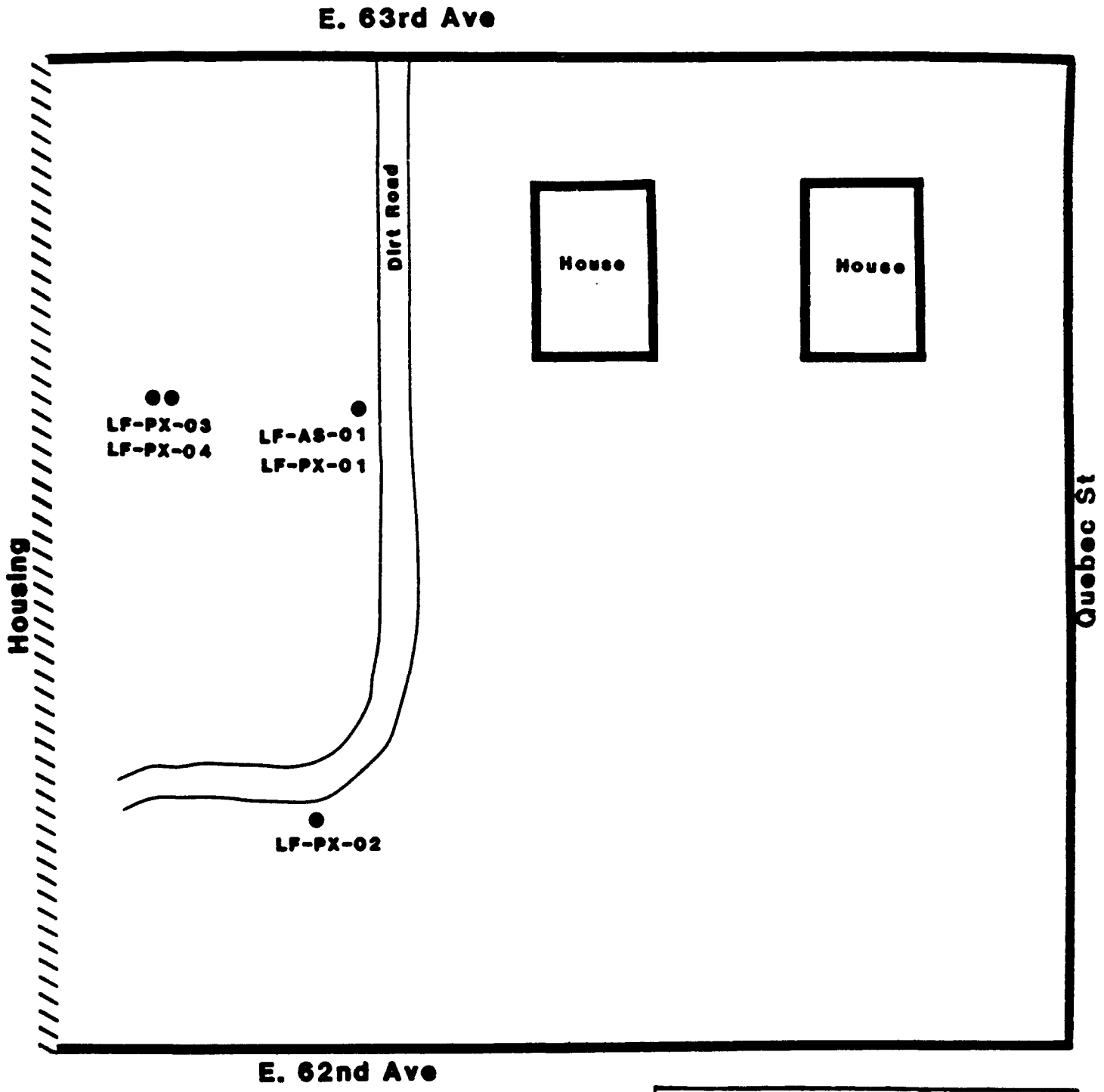
Cooper Energy Services was selected for screening sampling because of the uncontrolled washing process for large parts and machinery (TDD R8-8511-12). The stained area near the wash area indicated that runoff or spillage is contaminating the ground surface in this area.

I. LANDFILL AT 63RD AVENUE AND QUEBEC STREET

A landfill directly south of East 63rd Avenue between Poplar Street and Quebec Street has been inactive for many years. (Figure 10) However, ground water samples collected from the SACWSD well at East 64th Avenue and Quebec Street have shown the presence of chlorinated organics.



FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES TASK REPORT TO THE E.P.A.	
TITLE: Sampling Locations at Cooper Energy Services	
T.D.D. R8-8604-10	
ecology and environment, inc.	Fig. 9
Date: 3/86 Drawn by: E&E Scale: Not to Scale	



FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES TASK REPORT TO THE E.P.A.	
TITLE: Sampling Locations at Landfill. 63rd & Quebec St. T.D.D. R8-8604-10	
ecology and environment, inc.	Fig. 10
Date 3/86 Drawn by: E&E Scale: Not to scale	

This site was selected for screening sampling to determine if the landfill could possibly be contributing to contamination of the SACWSD well.

The landfill is approximately 500' x 500' and is fairly level except for the west-central section where it appears that fill material may have been added. The site is covered with grass and its intersected by a dirt road. There are a few small deciduous trees on the site. Various types of discarded household goods litter part of the site.

II. QUALITY ASSURANCE REVIEW

Samples collected during this investigation were all considered low hazard. The soil, water, and oily samples were analyzed for Hazardous Substance List organics and total metals. The soil vapor samples were analyzed for trichloroethylene, tetrachloroethylene, dichloroethylene, and 1,1,1-trichloroethane. One field blank sample (TK-WW-02) was prepared and one duplicate sample (HW-WW-02) was collected for quality control purposes.

The organic data packages were examined for quality assurance by an E&E/FIT reviewer. The findings are as follows:

1. Two volatile samples (CT-SS-01 and SS-SS-01) had surrogate recoveries that were not within the laboratory quality control range. These samples were reanalyzed and the same surrogates were again out of the quality control laboratory range. Therefore, all volatile compounds in these samples are flagged "J" or "UJ" for positive and negative results respectively. Sample HW-SS-01 had a surrogate recovery of less than 10% in the acid fraction. All compounds in the acid fraction are thus flagged "J" or "R" (estimated concentration) for positive and negative results respectively.

2. The calculation for the standard deviation was incorrect resulting in values that were too low. Concentration values were recalculated and action was taken based on these recalculations.

3. Eight pesticide samples were not extracted within the contractual limit of 10 days (OT-AS-01, OT-AS-02, TK-AS-01, HW-AS-01, HW-AS-03, WT-AS-01, WT-AS-02, LF-AS-01). All pesticides in these eight samples were flagged "J" or "UJ".

4. A large number of calibration compounds were outside of quality control limits. The analytical results for these compounds were flagged with a "J" for positive results. Negative results were flagged "UJ" or "R".

5. Samples HW-WW-01, HW-WW-02, OT-WW-01, OT-WW-02, and HW-SS-01 all exceeded their holding times and are all flagged "J" or "UJ" accordingly.

The organic data packages were judged as acceptable for use with the above qualifications. The data sheets and quality assurance report is shown in Appendix A. The field blank sample TK-WW-02 was found to contain methylene chloride, acetone and 2-butanone. These results were flagged with a "B" for all samples containing these contaminants. The duplicate sample, HW-WW-02 was found to be in good qualitative agreement with sample HW-WW-01 for organic contaminants. Quantitative results were also good.

The inorganic data packages were examined for quality assurance by an E&E/FIT reviewer. The findings are as follows:

1. Some soil antimony results, and the potassium results for water samples are unusable due to low spike recoveries. These results are qualified accordingly.

2. The remaining antimony results may have a negative bias. Samples MHC-606 through MHC-630 may have a positive bias for

silver. Samples MHC-631 through MHC-643 may have a positive bias for tin. These biased samples are flagged with an "R".

The inorganic data packages were judged as acceptable for use with these qualifications. The data sheets and quality assurance report is shown in Appendix A. The inorganic results for HW-WW-02 and HW-WW-01 were in very good agreement both qualitatively and quantitatively.

III. ANALYTICAL RESULTS

Analytical results for the 1986 sampling effort at these nine sites in South Adams County have been compiled in Tables 2 through 6. For organic HSL compounds, only compounds detected are reported. Corresponding sample locations are illustrated in Figures 2 through 10.

A review of the analytical data allows the following observations.

A. SURFACE SOIL SAMPLES

Organic contaminants found in the surface soil samples included dieldrin, 4,4'DDD, toluene, 4-methyl-2-pentanone, total xylenes, bis (2-ethylhexyl) phthalate, pyrene, phenanthrene, chrysene, tetrachloroethene and 1,1,1-trichloroethane. None of these organic contaminants were found above the detection limit in the background soil samples CS-AS-01 and RS-AS-01.

Sample CT-SS-01 from Colorado Truck Parts yielded significant concentrations of dieldrin and 4,4'DDD. Sample OT-SS-01 from Onnen Tank and Trailer contained significant concentrations of toluene, 4-methyl-2-pentanone, and total xylenes. Sample SS-SS-01 from Stewart & Stevenson Power contained significant concentrations of bis(2-ethylhexyl)phthalate, pyrene, phenanthrene, and chrysene. Sample CE-SS-01 from Cooper Energy Services contained total xylenes and tetrachloroethene at twice the detection limit. Sample GI-SS-01 taken from Ginco, Inc. contained 4,4'DDD in a concentration three times the detection limit. Sample WT-SS-01 from Ward Transport contained the

TABLE 2
ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES (ug/kg)
NINE SITES IN SOUTH ADAMS COUNTY.

	HC330 CT-AS-01	HC331 CT-SS-01	HC332 OT-AS-01	HC333 OT-AS-02	HC334 OT-SS-01	HC337 SS-AS-01	HC338 SS-AS-02	HC339 SS-SS-01	HC340 CE-AS-01
Methylene Chloride	6UB	2JB	27B	17UB	16UB	2JB	6UB	5UB	2JB
Acetone	40UB	18UB	29UB	5JB	38UB	170B	43UB	33UB	43UB
2-Butannone	64UB	15UB	24UB	21UB	29UB	58UB	63UB	18UB	92B
Bis(2-Ethylhexyl)Phthalate	150J	5100JB	95J	---	---	---	---	33000	---
Di-N-Buthylphthalate	---	---	100JB	79JB	---	---	---	3000JB	---
Dieldrin	---	180J	---	---	---	---	---	---	---
4,4'-DDD	---	130J	---	---	---	45J	---	---	---
4,4'-DDE	---	---	---	4J	---	---	---	---	---
Toluene	---	---	2J	2J	20	---	---	---	---
4-Methyl-2-Pentanone	---	---	---	---	590J	---	---	---	---
Ethylbenzene	---	---	---	---	2J	---	---	---	---
Total Xylenes	---	---	---	---	17	---	---	---	---
Carson Disulfide	---	---	---	---	1J	---	---	---	---
Endosulfan I	---	---	---	---	---	---	---	---	---
Chlorobenzene	---	---	---	---	---	---	---	---	---
Pentachlorophenol	---	---	---	---	---	---	---	---	---
Pyrene	---	---	---	---	---	---	---	3500J	---
Aroclor 1260	---	---	---	---	---	---	---	---	---
Tetrachloroethene	---	---	---	---	---	---	---	---	---
Naphthalene	---	---	---	---	---	---	---	---	---
2-Methylnaphthalene	---	---	---	---	---	---	---	---	---
Phenanthrene	---	---	---	---	---	---	---	2000J	---
Fluoranthene	---	---	---	---	---	---	---	---	---
Chrysene	---	---	---	---	---	---	---	2300J	---
Trichloroethene	---	---	---	---	---	---	---	---	---
Tetrachloroethene	---	---	---	---	---	---	---	---	---
Aldrin	---	---	---	---	---	---	---	---	---
Endrin Ketone	---	---	---	---	---	---	---	---	---

DATA QUALIFIER DEFINITIONS
Region 8

For the purposes of this data review document the following code letters and associated definitions are provided.

U - The material was analyzed for, but was not detected. The associated numerical value is the estimated sample quantitation limit.

J - The associated numerical value is an estimated quantity because the amount detected is below the required limits or because quality control criteria were not met.

UB - Estimated sample quantitation limit increased. Amount found in sample reported. Compound detected at <5 X the amount in blank (<10 X for methylene chloride, acetone, toluene and phthalates).

UJ - Detection limit is estimated because quality control criteria were not met.

JB - The value is an estimated amount detected below required limits and also detected in the blank.

B - Compound was detected in the blank. Quantity reported is >5 X the amount found in the blank (>10 X for methylene chloride, acetone, toluene, and phthalates).

R - Quality Control indicates that data is not usable (compound may or may not be present). Resampling and reanalysis is necessary for verification.

N - No analytical result.

P - Presumptive evidence of presence of material (tentative identification).

NR - not required by contract at this time

Form I:

Value - If the result is a value greater than or equal to the instrument detection limit but less than the contract required detection limit, report the value in brackets (i.e., [10]). Indicate the analytical method used with P (for ICP/Flame AA) or F (for furnace).

U - Indicates element was analyzed for but not detected. Report with the detection limit value (e.g., 10U).

E - Indicates a value estimated or not reported due to the presence of interference. Explanatory note included on cover page.

S - Indicates value determined by Method of Standard Addition.

R - Indicates spike sample recovery is not within control limits.

* - Indicates duplicate analysis is not within control limits.

+ - Indicates the correlation coefficient for method of standard addition is less than 0.995

TABLE 2
ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES (ug/kg)
NINE SITES IN SOUTH ADAMS COUNTY.

	HC341 CE-AS-02	HC342 CE-SS-01	HC343 GI-AS-01	HC344 GI-AS-02	HC345 GI-AS-03	HC346 GI-SS-01	HC347 CS-AS-01	HC348 RS-AS-01	HC349 TK-AS-01
Methylene Chloride	10JB	8JB	13UB	7UB	6UB	7UB	2JB	5UB	4JB
Acetone	77UB	79UB	12UB	94UB	22UB	13UB	11UB	23UB	140UB
2-Butannone	58UB	51UB	16UB	10UB	11UB	11UB	10UB	11UB	24UB
Bis(2-Ethylhexyl)Phthalate	---	---	87J	---	51J	850J	---	---	55J
Di-N-Buthylphthalate	---	---	82J	65J	---	---	190J	48J	120B
Dieldrin	---	---	---	---	---	5J	---	---	---
4,4'-DDD	---	---	8J	---	---	13J	---	---	33J
4,4'-DDE	---	---	7J	---	---	7J	---	---	---
Toluene	---	---	---	7J	---	---	---	2J	12
4-Methyl-2-Pentanone	---	---	---	---	---	---	---	---	6J
Ethylbenzene	---	---	---	---	---	---	---	---	---
Total Xylenes	---	20J	---	---	---	---	---	---	3J
Carbon Disulfide	---	---	---	---	---	---	---	---	---
Endosulfan I	---	---	---	---	---	---	---	---	28J
Chlorobenzene	---	---	---	---	---	---	---	---	---
Pentachlorophenol	---	---	---	---	---	---	---	---	---
Pyrene	---	---	---	---	---	---	---	---	---
Aroclor 1260	---	---	---	---	---	---	---	---	---
Tetrachloroethene	---	---	---	---	---	---	---	---	---
Naphthalene	---	---	---	---	---	---	---	---	---
2-Methylnaphthalene	---	---	---	---	---	---	---	---	---
Phenanthrene	---	---	---	---	---	---	---	---	---
Fluoranthene	---	---	---	---	---	---	---	---	---
Chrysene	---	---	---	---	---	---	---	---	---
Trichloroethene	---	---	---	---	---	---	---	---	---
Tetrachloroethene	---	10J	---	---	---	---	---	---	---
Aldrin	---	---	---	---	---	---	---	---	---
Endrin Ketone	---	---	---	---	---	---	---	---	---

TABLE 2
ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES (ug/kg)
NINE SITES IN SOUTH ADAMS COUNTY.

	HC350 TK-AS-02	HC353 TK-SS-01	HC356 HW-AS-01	HC357 HW-AS-02	HC358 HW-AS-03	HC363 WT-AS-01	HC364 WT-AS-02	HC365 WT-SS-01	HC366 LF-AS-01
Methylene Chloride	27B	21B	11UB	29B	5UB	10UB	12UB	35B	15B
Acetone	190B	99DB	82DB	12UB	13UB	15UB	270UB	24UB	5300B
2-Butannone	90UB	18UB	57UB	20UB	17UB	14UB	16UB	16UB	14UB
Bis(2-Ethylhexyl)Phthalate	---	---	---	---	84J	---	47J	4400J	40J
Di-N-Buthylphthalate	---	---	79JB	2200J	120JB	99JB	95JB	3100J	81JB
Dieldrin	---	---	---	---	---	26J	540J	28D	---
4,4'-DDD	---	---	---	---	---	---	---	---	---
4,4'-DDE	---	---	---	---	---	---	---	---	---
Toluene	19D	2J	3J	4J	---	---	3J	---	1J
4-Methyl-2-Pentanone	---	---	---	---	---	---	---	---	---
Ethylbenzene	38	---	---	---	---	---	---	---	---
Total Xylenes	160	7	---	---	---	---	---	---	---
Carbon Disulfide	2J	---	---	---	---	---	---	---	---
Endosulfan I	---	---	---	---	---	---	---	---	---
Chlorobenzene	170D	---	---	---	---	---	---	---	---
Pentachlorophenol	---	---	---	---	---	---	---	---	---
Pyrene	---	---	---	---	47J	120J	---	---	---
Aroclor 1260	---	---	---	---	180J	---	---	---	---
Tetrachloroethene	---	---	---	---	---	3J	---	---	---
Naphthalene	---	---	---	---	---	84J	---	---	---
2-Methylnaphthalene	---	---	---	---	---	250J	---	---	---
Phenanthrene	---	---	---	---	---	76J	---	---	---
Fluoranthene	---	---	---	---	---	79J	---	---	---
Chrysene	---	---	---	---	---	36J	---	---	---
Trichloroethene	---	---	---	---	---	---	3J	---	---
Tetrachloroethene	---	---	---	---	---	---	1J	---	---
Aldrin	---	---	---	---	---	---	54J	---	---
Endrin Ketone	---	---	---	---	---	---	23J	---	---

TABLE 3

ORGANIC ANALYTICAL RESULTS

WATER SAMPLES (ug/l)

NINE SITES IN SOUTH ADAMS COUNTY

	HC354 TK-WW-01	HC355 TK-WW-02
Methylene Chloride	2JB	750B
Acetone	20UB	9JB
2-Butanone	11UB	20UB
Pentachlorophenol	---	---
Di-N-Butylphthalate	52	---
Bis(2-ethylhexyl)phthalate	7JB	---
	4JB	---

TABLE 4

ORGANIC ANALYTICAL RESULTS

OILY LIQUIDS AND SOLIDS (ug/l, ug/kg)

NINE SITES IN SOUTH ADAMS COUNTY

SAMPLE TAG NUMBER	HB043	HB042	HC368	HC369	HC370
SAMPLE NUMBER	HW-WW-01	HW-WW-02	OT-WW-01	OT-WW-02	HW-SS-01
Methylene Chloride	720B	850B	1800B	750B	570B
Acetone	120J	120J	7000B	1700B	110J
Di-N-Octylphthalate	550J	460J	---	---	---
1,1,1 Trichloroethane	---	---	230J	---	230J
1,2,Dichloropropane	---	---	110J	---	---
Benzene	---	---	67J	---	---
4-Methyl-2-Pantanone	---	---	210J	---	---
Toluene	---	---	180J	290J	---
Total Xylenes	---	---	210J	1800J	55J
Naphthalene	---	---	22000J	---	---
2-Methylnapthalene	---	---	26000J	---	---
Dibenzofuran	---	---	5600J	---	---
Phenanthrene	---	---	1800J	---	440J
Anthracene	---	---	1100J	---	---
Butylbenzylphthalate	---	---	1100J	---	---
Benzo(a)anthracene	---	---	540J	---	---
Chrysene	---	---	1600J	---	---
Benxo(b)fluoranthene	---	---	270J	---	---
Phenol	---	---	---	---	390J
Di-N-Butylphthalate	---	---	---	---	470J
Bis(2-ethylhexyl)pthalate	---	---	---	---	1800JB

TABLE 5

INORGANIC ANALYTICAL RESULTS

SOIL SAMPLES (ug/kg)

NINE SITES IN SOUTH ADAMS COUNTY

TRAFFIC REPORT NUMBER	MHC606	MHC607	MHC608	MHC609	MHC610	MHC614
SAMPLE NUMBER	CT-AS-01	CT-SS-01	OT-AS-01	OT-AS-02	OT-SS-01	SS-AS-01
Aluminum	2150P	6200	10700	9030	5640	10100
Antimony	26UR	49R	29UR	29UR	27UR	44UR
Arsenic	4.2U	4.5US	(4.6)	(4.6)	(4.4)	7.0U
Barium	35U	174	145	130	148	(168)
Beryllium	1.6U	1.7U	1.7U	1.7U	1.6U	2.6U
Cadmium	2.1U	4.8	2.3U	2.3U	2.2U	3.5U
Calcium	(762)	(2310)	17200	6350	21600	(3480)
Chromium	4.2U	47	10	8.0	(4.8)	15
Cobalt	10U	11U	12U	12U	11U	18U
Copper	8.3U	49	18	16	9.1	(18)
Iron	3530	13600	13600	14200	9050	17350
Lead	4.7	19600	14	14	14	13
Magnesium	(475)	(1510)	3910	(2720)	(1520)	(3310)
Manganese	71	364	289	325	293	441
Mercury	0.10U	0.11U	0.11U	0.11U	0.10U	0.17U
Nickel	10U	11U	(13)	12U	11U	18U
Potassium	(269)	(1000)	(1870)	(1270)	(386)	(1820)
Selenium	2.1U	2.2U	2.3U	2.3U	2.2U	3.5U
Silver	3.6UR	3.9UR	4.1UR	4.0UR	3.8UR	6.1UR
Sodium	1400U	1510U	1570U	1550U	1480	2370U
Thallium	3.1U	3.4U	3.5U	3.5U	3.3U	5.3U
Tin	14UR	15UR	16UR	16UR	15UR	24UR
Vanadium	16U	17U	31	31	(27)	26U
Zinc	18	200	44	41	50	54

TABLE 5 (cont'd)
INORGANIC ANALYTICAL RESULTS
SOIL SAMPLES (ug/kg)
NINE SITES IN SOUTH ADAMS COUNTY

TRAFFIC REPORT NUMBER	MHC622	MHC623	MHC624	MHC625	MHC626	MHC627
SAMPLE NUMBER	GI-AS-03	GI-SS-01	CS-AS-01	RS-AS-01	TK-AS-01	TK-AS-02
Aluminum	12700	13100	8420	8630	3020	10300
Antimony	29UR	29UR	28UR	27UR	29UR	43UR
Arsenic	46US	(5.3)	4.5U	4.3U	4.6U	8.7
Barium	161	172	120	(101)	(90)	238
Beryllium	1.7U	1.8U	1.7U	1.6U	1.7U	2.6U
Cadmium	2.3U	2.3U	2.2U	2.1U	2.3U	20
Calcium	3990	14700	(2010)	(2250)	(1480)	8750
Chromium	14	16	13	12	6.5	73
Cobalt	11U	12U	11U	11U	12U	17U
Copper	21	31	(13)	(12)	15	104
Iron	16800	22800	13000	12600	7060	21200
Lead	19	29	13	14	13	227
Magnesium	3420	4510	(2180)	(2120)	(912)	(3040)
Manganese	506	516	428	285	165	303
Mercury	0.11U	0.11U	0.11U	0.10U	0.11U	0.8
Nickel	(15)	(15)	(11)	(13)	12U	(19)
Potassium	3240	3790	(1870)	(1520)	(986)	(1860)
Selenium	2.3U	2.3U	2.2U	2.1U	2.3U	3.5U
Silver	4.0UR	4.1UR	3.9UR	3.8UR	4.0UR	6.1UR
Sodium	1550U	1580U	1510U	1450U	1560U	2340U
Thallium	3.4U	3.5U	3.3U	3.2U	3.5U	5.2U
Tin	15UR	16UR	15UR	14UR	16UR	49R
Vanadium	32	45	(23)	(26)	(18)	(30)
Zinc	64	100	56	39	28	598

TABLE 5 (cont'd)
INORGANIC ANALYTICAL RESULTS
SOIL SAMPLES (ug/kg)
NINE SITES IN SOUTH ADAMS COUNTY

TRAFFIC REPORT NUMBER	MHC630	MHC644	MHC633	MHC634	MHC635	MHC640
SAMPLE NUMBER	TK-SS-01	HW-SS-01	HW-AS-01	HW-AS-02	HW-AS-03	WT-AS-01
Aluminum	9630	9950	8300	3380	6410	6940
Antimony	29UR	30UR	29UR	27UR	29UR	---
Arsenic	(4.7)	5U	(4.6)	4.3U	4.6U	4.80
Barium	188	19S	143	(77)	180	159
Beryllium	1.7U	1U	1.7U	1.6U	1.7U	1.8U
Cadmium	2.3U	3	2.3U	2.1U	2.3U	2.4U
Calcium	10200	7500	3280	3290	7090	4820
Chromium	11	20	12	6.3	21	10
Cobalt	12U	20U	11U	11U	12U	12U
Copper	25	50	(12)	33	33	36
Iron	15100	16400	11600	6770	10400	11100
Lead	40	101R	12	29	85	45
Magnesium	(2780)	2500	(2710)	1120	(2140)	(2120)
Manganese	424	275	348	236	271	322
Mercury	0.11U	.1U	0.11U	0.10U	0.11U	0.11U
Nickel	12U	20U	11U	11U	12U	12U
Potassium	(1600)	(2000)	(1870)	(565)	(1240)	(1270)
Selenium	2.3U	2.5U	2.3U	2.1U	2.3U	2.4U
Silver	4.1UR	5U	4.0U	3.7U	4.0U	4.2U
Sodium	1570U	2500U	1540U	1430U	1560U	1600U
Thallium	3.5U	5U	3.4U	3.2U	3.5U	3.6U
Tin	16UR	20U	15UR	14UR	16UR	16UR
Vanadium	34	(20)	(24)	16U	(20)	(21)
Zinc	105	170	42	52	130	79

TABLE 5 (cont'd)
INORGANIC ANALYTICAL RESULTS
SOIL SAMPLES (ug/kg)
NINE SITES IN SOUTH ADAMS COUNTY

TRAFFIC REPORT NUMBER	MHC641	MHC642	MHC643
SAMPLE NUMBER	WT-AS-02	WT-SS-01	LF-AS-01
Aluminum	6660	7230	11700
Antimony	---	---	---
Arsenic	4.3U	4.9U	(4.5)
Barium	282	170	193
Beryllium	1.6U	1.8U	1.7U
Cadmium	2.2U	3.4	2.3U
Calcium	4210	3400	3460
Chromium	9.2	19	17
Cobalt	11U	12U	11U
Copper	16	55	17
Iron	11000	11700	16900
Lead	22	133	18
Magnesium	(1990)	(2360)	3530
Manganese	767	243	571
Mercury	0.10U	0.12U	0.11U
Nickel	11U	(17)	(12)
Potassium	(1080)	(1430)	3100
Selenium	2.2U	2.5U	2.3U
Silver	3.8U	4.3U	4.0U
Sodium	1460U	1660U	1530U
Thallium	3.3U	3.7U	3.4U
Tin	15UR	17UR	15UR
Vanadium	(24)	(24)	29
Zinc	41	168	91

TABLE 5 (cont'd)

INORGANIC ANALYTICAL RESULTS

SOIL SAMPLES (ub/kg)

NINE SITES IN SOUTH ADAMS COUNTY

TRAFFIC REPORT #	MHC615	MHC616	MHC617	MHC618	MHC619	MHC620	MHC621
SAMPLE NUMBER	SS-AS-02	SS-SS-01	CE-AS-01	CE-AS-02	CE-SS-02	GI-AS-01	GI-AS-02
Aluminum	8900	6590	5920	7790	6200	18600	20600
Antimony	28UR	29UR	27UR	28UR	28UR	32UR	28UR
Arsenic	4.5U	4.U	4.4U	4.5U	4.4U	(5.7)	6.8S
Barium	150	362	(94)	128	(90)	190	205
Beryllium	1.7U	1.7U	1.6U	1.7U	1.7U	1.9U	1.7U
Cadmium	2.2U	31	2.2U	2.2U	2.2U	2.5U	2.3U
Calcium	2880	12700	(2230)	(1610)	(1420)	8670	7900
Chromium	12	66	7.9	12	9.5	19	21
Cobalt	11U	11U	11U	11U	11U	13U	(12)
Copper	17	357	(10)	(11)	23	25	23
Iron	13500	16500	10000	11300	10800	21700	23600
Lead	15	415	9.2	11	28	17	21
Magnesium	(2480)	3080	(1880)	(1970)	(1650)	5240	5400
Manganese	384	350	220	488	382	522	502
Mercury	0.11U	1.7	0.10U	0.11U	0.10U	0.12U	0.11U
Nickel	11U	87	11U	11U	11U	(20)	(20)
Potassium	(2030)	(1160)	(1050)	(1700)	(1530)	4740	4750
Selenium	2.2U	2.3U	2.2U	2.2U	2.2U	2.5U	2.3U
Silver	3.9UR	4.0UR	3.8UR	2.9UR	3.9UR	4.4UR	3.9UR
Sodium	1520U	1550U	1470U	1520U	1490U	1710U	1530U
Thallium	3.4U	3.4U	3.3U	3.4U	3.3U	3.8U	3.4U
Tin	15UR	45R	15UR	15UR	15UR	17UR	15UR
Vanadium	(18)	17U	16U	17U	(20)	40	46
Zinc	54	661	27	44	57	71	76

TABLE 6

INORGANIC ANALYTICAL RESULTS

WATER SAMPLES (UG/L)

NINE SITES IN SOUTH ADAMS COUNTY

TRAFFIC REPORT NUMBER	MHC645	MHC646	MHC631	MHC632
SAMPLE NUMBER	HW-WW-02	HW-WW-01	TK-WW-01	TK-WW-02
Aluminum	7600	7800R	1100	251
Antimony	60U	60U	[59]	50U
Arsenic	10UR	10UR	8U	80U
Barium	100U	100U	67U	67U
Beryllium	2U	2U	3U	3U
Cadmium	5	4U	4U	4U
Calcium	80000	83000	30000	[846]
Chromium	10U	10U	11	8U
Cobalt	40U	40U	20U	20U
Copper	30	30	32	[21]
Iron	9600	9700	1630	238
Lead	50R	42R	15	[4]
Magnesium	16000	16000	[4370]	238U
Manganese	920	910	240	14U
Mercury	.4U	.2U	0.19U	0.19U
Nickel	40U	40U	20U	20U
Potassium	8000	8000	9070R	---
Selenium	5U	5U	4U	4U
Silver	10U	10U	7UR	7UR
Sodium	140000	150000	80000R	[2790]R
Thallium	10U	10U	6U	6U
Tin	40U	40U	27UR	27UR
Vanadium	30U	30U	30U	30U
Zinc	250	190	117	21

pesticide dieldrin at seventy times the detection limit (280 ug/kg). Sample HW-SS-01 from H.W. Moore Equipment Co. yielded concentrations of total xylenes and 1,1,1-trichloroethane (230J ug/kg).

Inorganic results for the surface soil samples collected at Colorado Truck Parts, Ward Transport and Stewart Stevenson revealed significant concentrations of lead, copper, chromium, mercury, and zinc. The values for these contaminants were significantly above that for the background soil samples CS-AS-01 and RS-AS-01.

Sample CT-SS-01 from Colorado Truck Parts had a high concentration of lead. Sample SS-SS-01 from Stewart and Stevenson Power contained high levels of chromium, copper, lead, mercury, and zinc. Sample WT-SS-01 from Ward Transport contained moderately high levels of lead and zinc.

Data results for surface soil samples are included as Table 2.

B. SUBSURFACE SOIL SAMPLES

Organic contaminants found in the subsurface soil samples include 4,4'DDD, toluene, ethylbenzene, total xylenes, chlorobenzene, Aroclor 1260, aldrin and endrin ketone. These organic contaminants were all undetected in the background soil samples CS-AS-01, and RS-AS-01.

Sample SS-AS-01 from Stewart and Stevenson Power contained a high concentration of 4,4'DDD. Sample TK-AS-01 from Thermo King Denver contained toluene at twice the detection limit. Sample TK-AS-01, also from Thermo King Denver, contained toluene at thirty-eight times the detection limit, ethylbenzene at over seven times the detection limit, total xylenes at thirty-two times the detection limit and chlorobenzene at three hundred and forty times the detection limit (1700 ug/kg). Sample HW-AS-03 from H.W. Moore Equipment Co. contained the pesticide Aroclor 1260 at four times the detection limit. Sample WT-AS-02 from

Ward Transport contained aldrin at twenty-seven times the detection limit and endrin ketone at five times the detection limit.

Inorganic results for the subsurface soil samples revealed copper and lead in several of the samples. The values for these contaminants were significantly above that for the background soil samples CS-AS-01 and RS-AS-01. Lead concentrations in samples TK-AS-02, HW-AS-03, and WT-AS-01 were 3 to 17 times background concentrations.

Sample TK-AS-02, taken at Thermo King Denver, contained chromium copper, lead and zinc. All of these were higher concentration than background.

C. SURFACE WATER SAMPLES

Organic contaminants found in the surface water sample, OT-WW-01, included 1,1,1-trichloroethane, phenanthrene, dibenzofuran, 2-methylnaphthalene, naphthalene, total xylenes and toluene. Sample OT-WW-02 also contained toluene and total xylenes in significant concentration. These two samples were taken at Onnen Tank and Trailer. These samples were the only surface water samples showing detectable levels of organic contaminants of concern. The level of 1,1,1-trichloroethane in sample OT-WW-01 was 230J ug/l. Dibenzofuran concentration in OT-WW-01 was 5600J ug/l. All organic results are flagged for surface water samples due to the exceeding of holding times.

Inorganic results for the surface water samples revealed the detection of only iron in significant amounts.

D. SOIL VAPOR SAMPLES

Soil vapor monitoring was conducted at the nine sites utilizing Petrex soil gas collectors. The Petrex soil gas collector tube consists of a sealed 6 inch glass tube into which a ferromagnetic wire having an affixed charcoal absorbent has been inserted. Gas molecules are absorbed onto this wire when the tube is uncapped and placed

open-end down beneath the ground surface. The collectors were left in the ground for two weeks. Upon retrieval, the tubes were capped and the wires analyzed for volatile organic compounds by Curie point desorption mass spectrometry.

Petrex analyzed the collecters for dichloroethene, (DCE) trichloroethene (TCE) and tetrachloroethene (PCE). Table 7 presents the sample locations where these compounds were identified and their ion flux. None of the compounds were detected in the background samples, RS-PX-01 and CS-PX-01. DCE was detected at H.W. Moore at sample location HW-PX-02. Only two sample locations showed the presence of TCE, OT-PX-02 (Onnen Tank & Trailer) and WT-PX-02, (Ward Transport). PCE was identified positively at 4 sites, H.W. Moore Equipment Co., Onnen Tank & Trailer, Cooper Energy Services and Ward Transport. Tenative identification of PCE was made at Colorado Truck Parts, Ginco, Inc. and the landfill.

E. TENTATIVELY IDENTIFIED COMPOUNDS

The large majority of tentatively identified compounds from these nine sites consisted of alcohols and alkanes. This was a consistent finding and is indicative of petroleum or solvent use and disposal.

IV. CONCLUSIONS

A. ORGANICS

The wider variety of organic compounds detected at significant levels in surface samples compared to subsurface samples is probably a reflection of biased collection of the surface soil samples from stained areas. Compounds detected in surface soil samples at a site were not identified in subsurface samples taken at other locations at the same site. Therefore, the contaminants found in the surface soil spill areas appear to be highly localized within the upper soil zone. Several of the compounds detected in these stained surface areas are

TABLE 7

SOIL VAPOR ION FLUX (INTEGRATED ION COUNTS),

SOUTH ADAMS TARGET CONTAMINANTS

	DCE	TCE	PCE
HW-PX-02	54729	NI	NI
HW-PX-03	NI	NI	2111
HW-PX-04	NI	NI	478
OT-PX-02	NI	10935	NI
TK-PX-03	NI	NI	1173
CE-PX-01	NI	NI	7201
WT-PX-02	NI	18376	16139
CT-PX-01	NI	NI	3099J
CT-PX-02	NI	NI	4519J
GI-PX-02	NI	NI	328J
LF-PX-02	NI	NI	279J

NI indicates not identified

J indicates mass spectra do not completely match predicted values

fuel constituents and are most likely the result of spillage during fueling of vehicles.

The chlorinated hydrocarbons tetrachloroethylene (PCE) and 1,1,1-trichloroethane (1,1,1-TCA) were identified in surface soil samples at H.W. Moore Equipment Company and Cooper Energy Services. Both of these establishments are known to use solvents. However, these compounds were not detected in subsurface samples taken near the stained surface areas. Chlorobenzene was the only other chlorinated solvent detected at a significant level. This compound is used as a solvent and heat transfer medium and was identified in a subsurface soil sample collected from Thermo King, a firm which services refrigerated truck trailers.

Oily water samples taken from the two sumps at Onnen Tank and Trailer showed the presence of 1,1,1-TCA, total xylenes and toluene, all compounds used as solvents. These contaminants may be used in the tanker cleaning operation or may be present in the tanker trailers themselves, or could originate in the service area. Toluene and total xylenes were also detected in surface soil samples collected from stained areas.

Water samples taken from the sump at H.W. Moore Equipment Company and the trench at Thermo King were free of significant levels of contaminants and therefore do not present a problem as a contaminant source at this time.

Five different pesticides were detected at significant levels. Some type of pesticide was identified at five of the nine sites. These persistent contaminants are most likely present as a result of previous historical use. Much of the South Adams County area was previously utilized for agricultural purposes. These pesticides could be residue from previous farming of these areas or from current insect control practices.

B. INORGANICS

Lead was detected at three sites in surface soil samples taken from stained areas. Organic data from these samples indicates that material spilled in these areas is likely to be fuel. The presence of lead suggests leaded gasoline.

Subsurface soil samples collected from Thermo King showed the presence of chromium, copper, zinc and lead. This firm occupies an area previously used as a landfill. Significant levels of these metals may be a result of the presence of buried metal wastes. This sample, TK-AS-02, was collected by augering three feet into the bottom of a three to four foot deep trench. Therefore the sample collected was actually six to seven feet below the ground surface.

C. SOIL VAPOR

The Petrex soil vapor collectors provided valuable information that was not obtainable through conventional sampling methods. This method of soil gas monitoring is a sensitive means for detection of chlorinated hydrocarbons. Although PCE was detected in only one soil sample analyzed by a CLP laboratory, and TCE not at all, Petrex soil vapor collectors indicated the presence of TCE at two sites and PCE in ten samples (four of which were tentative identifications).

Interpretations of the Petrex data should be made carefully because only two to four collecters were placed at each site. A large data base would aid in interpretation of data.

PCE is a major constituent in a solvent (Zepp 300) in common use in the South Adams County area. Its detection in these samples may be more an indication of on-site use and spillage onto soil rather than ground water contamination since it is less mobile than TCE. In fact, the ion flux for each of the contaminants could be viewed as an

indicator of local usage. Therefore, the potential for ground water contamination increases as soil ion flux increases.

TCE and PCE were both detected at two sites which have been associated with one another with regards to site location. Onnen Tank & Trailer was once located directly adjacent to Ward Transport. The identification of both TCE and PCE at a site occurred only at these two locations. This may hold some significance in that the TCE and PCE at Ward Transport could be residues left by Onnen Tank & Trailer.

No apparent pattern of biodegredation was observed whereby PCE degrades to TCE which degrades to DCE. When it occurred, TCE exceeded PCE and DCE was identified in the absence of any parent compounds. DCE and TCE are important solvents in their own right and appear to be present due to product use rather than biodegredation.

V. RECOMMENDATIONS

There does not appear to be heavy TCE or PCE contamination at any of the nine sites. TCA and PCE were detected at 2 sites, H.W. Moore Equipment Co. and Cooper Energy Services, however, these contaminants were identified in areas where solvent has probably been spilled on the ground during product use. This contamination appears to be restricted to the ground surface in localized areas. Soil vapor results indicated the presence of PCE at five of the sites, however, it is possible that this contamination is due to ground water contamination which originated from a site in an adjacent area, or to surface spillage of solvent during general product use. In the latter case, much of the solvent would evaporate into the atmosphere.

Although FIT utilized biased sampling at the sites, there is the possibility that TCE or PCE contamination could exist on the sites in areas which were not chosen for sampling. A spill that occurred ten to fifteen years ago would not be visible today.

From the data collected in this investigation, FIT does not recommend further sampling at these sites for the present time. However, it is obvious that a more extensive soil vapor study which would cover a large area would provide more detailed information on TCE and PCE contaminant patterns and greatly facilitate the contaminant source investigation process. Such a study would direct interviewing and sampling activities in known areas of contamination. By concentrating efforts in these areas, FIT would economize resources by eliminating site investigations in areas which are not significantly contaminated.